

CLAIMS

We claim:

5 1. A composition comprising a metallic surface and an asymmetric monolayer forming species having
the formula:



10 wherein

A is an attachment linker moiety selected from the group comprising sulfur and phosphonate;
MFS is a monolayer forming species comprising conductive oligomers and insulators; and
AG is an electroconduit forming species.

15 2. A composition according to claim 1 wherein A is sulfur.

3. A composition according to claim 1 wherein said metallic surface is gold.

4. A composition according to claim 1 wherein said MFS is an insulator.

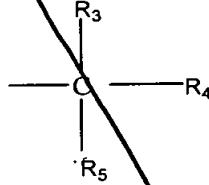
20 5. A composition according to claim 4 wherein said insulator comprises an alkyl group from about 7 to
20 carbons.

6. A composition according to claim 5 wherein said alkyl group comprises a heteroalkyl.

25 7. A composition according to claim 5 wherein said alkyl group comprises a substituted alkyl.

8. A composition according to claim 1 wherein said AG comprises an alkyl group from about 1 to 6
carbons.

30 9. A composition according to claim 1 or 8 wherein said AG is branched, having the formula:



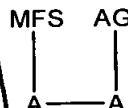
35 wherein

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~~R₃ through R₅ are independently selected from the group consisting of hydrogen, alkyl, aryl, alcohol, amine, amido, nitro, ether, ester, ketone, imino, aldehyde, alkoxy, carbonyl, halogen, sulfur containing moiety and phosphorus containing moiety;~~

5 10. A composition according to claim 9 wherein said AG is attached to said attachment linker via a (CH₂)_n group, wherein n is an integer from 0 to 4.

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CA*
11. A composition according to claim 9 wherein said AG is attached directly to said attachment linker.

10 12. A method of modifying a metallic surface comprising contacting the metallic surface with an asymmetric monolayer forming species having the formula:



wherein

A is an attachment linker moiety;

MFS is a monolayer forming species; and

AG is an electroconduit forming species.

13. A method according to claim 12 further comprising contacting said metallic surface with a biological species having the formula:

25 A-MFS-capture binding ligand

wherein

A is an attachment linker; and

MFS is a monolayer forming species.

30 14. A method according to claim 13 wherein said capture binding ligand is a nucleic acid.

15. A method according to claim 13 wherein said capture binding ligand is a protein.

35 16. A method according to claim 12 wherein A is sulfur.

17. A method according to claim 12 wherein said metallic surface is gold.

18. A method according to claim 12 wherein said MFS is an insulator.

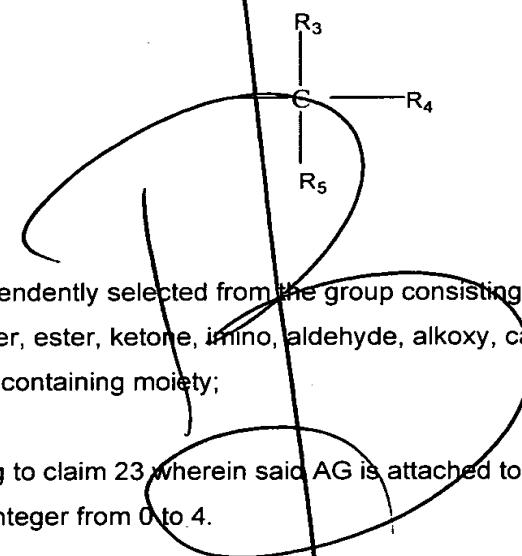
19. A method according to claim 18 wherein said insulator comprises an alkyl group from about 7 to 20 carbons.

5 20. A method according to claim 19 wherein said alkyl group comprises a heteroalkyl.

21. A method according to claim 19 wherein said alkyl group comprises a substituted alkyl.

10 22. A method according to claim 12 wherein said AG comprises an alkyl group from about 1 to 6 carbons.

23. A method according to claim 12 or 22 wherein said AG is branched, having the formula:



25 25. A method according to claim 23 wherein said AG is attached directly to said attachment linker.

30 26. A method of detecting a target analyte in a sample comprising:

a) binding said target analyte to a metallic surface comprising

i) an asymmetric monolayer forming species having the formula:



ii) a species having the formula A-MFS-capture binding ligand; and

wherein

A is an attachment linker moiety;
MFS is a monolayer forming species; and
AG is an electroconduit forming species; and
b) binding a solution binding ligand to said target analyte, wherein said solution binding ligand comprises a first portion that will bind to said target analyte and a recruitment linker comprising a first portion comprising at least one ETM; and
c) detecting the presence of said ETM as an indication of the presence of the target analyte.

27. A method according to claim 26 wherein said recruitment linker is directly attached to said target analyte.

28. A method according to claim 26 wherein said recruitment linker is indirectly attached to said target analyte.

29. A method according to claim 26 wherein said ETM is a transition metal complex.

30. A method according to claim 26 wherein said ETM is metallocene.

31. A method according to claim 26 wherein said ETM is ferrocene.

32. A method according to claim 26 wherein said ETM is an organic electron transfer moiety.

33. A method according to claim 26 wherein said capture binding ligand is a nucleic acid.

34. A method according to claim 26 wherein said capture binding ligand is a protein.

35. A method according to claim 26 wherein A is sulfur.

36. A method according to claim 26 wherein said metallic surface is gold.

37. A method according to claim 26 wherein said MFS is an insulator.

38. A method according to claim 37 wherein said insulator comprises an alkyl group from about 7 to 20 carbons.

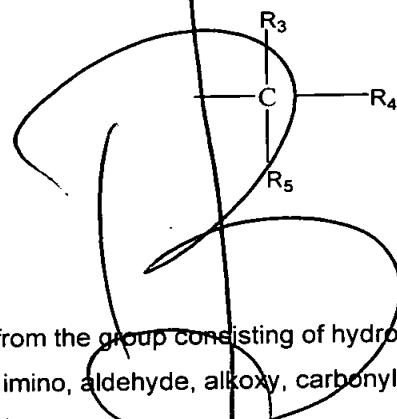
39. A method according to claim 38 wherein said alkyl group comprises a heteroalkyl.

40. A method according to claim 38 wherein said alkyl group comprises a substituted alkyl.

41. A method according to claim 26 wherein said AG comprises an alkyl group from about 1 to 6 carbons.

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42. A method according to claim 26 wherein said AG is branched, having the formula:



wherein

R₃ through R₅ is selected from the group consisting of hydrogen, alkyl, aryl, alcohol, amine, amido, nitro, ether, ester, ketone, imino, aldehyde, alkoxy, carbonyl, halogen, sulfur containing moiety and phosphorus containing moiety;

43. A method according to claim 26 wherein said AG is attached to said attachment linker via a (CH₂)_n group, wherein n is an integer from 0 to 4.

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44. A method according to claim 26 wherein said AG is attached directly to said attachment linker.

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